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| Project Overview page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Name of Project:** | | | Gigantic Invisible Triangles | | | | | | | | | | | | | | | | **Duration:** | | | 3 weeks | | | | | | |
| **Subject/Course:** | | | **Algebra 2** | | | | | | | **Teacher(s): Bond, Harris, Taormina** | | | | | | | | | **Grade Level:** | | | 11 | | | | | | |
| **Other Subject Areas to Be Included:** | | | U.S. History | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Project Idea**  Summary of the issue, challenge, investigation, scenario, or problem: | | | Have you ever wondered how tall a building is, or how high your kit flies? Learn how to use the mathematics of right triangles to measure the height of a tall object using two measurements that you can make on the ground.  Students use a construction 100-m tape measure and an inclinometer to measure one side and angle of a right triangle that includes the height of the building as one leg. Then, students will use the trigonometry of right triangles to solve for the height measurement. Students will plot the relationship between the tangent function and the angle, and they will draw conclusions about how far away they need to be from the base of the building to make their measurements accurate. Students will travel to downtown Nashville to measure the height of the "bat building" and other tall structures.  In English 3, students will read the "Great Gatsby." One of the major themes students will discuss is the shift in power between old aristocratic money and new money. During the period of history when the Great Gatsby takes place, there is a movement in American Architecture in which buildings grew significantly taller and there was competition among cities to have the pride of the tallest building. Students will create either a physical scaled model or a multimedia presentation to illustrate the progression of the 30 tallest U.S. buildings in the 20th century. | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Essential Question** | | | How can I use the properties of right triangles to measure the height of tall objects?  How can I analyze works of literature to gain an understanding of the historical period about which they are written? | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Content Standards** to be taught and assessed**:** | | | Algebra 2:  SPI 3103.1.1 Move flexibly between multiple representations (contextual, physical, written, verbal, iconic/pictorial, graphical, tabular, and symbolic) of non-linear and transcendental functions to solve problems, to model mathematical ideas, and to communicate solution strategies.  SPI 3103.1.3 Use technology tools to identify and describe patterns in data using non-linear and transcendental functions that approximate data as well as using those functions to solve contextual problems.  SPI 3103.1.4 Use mathematical language, symbols, definitions, proofs and counterexamples correctly and precisely to effectively communicate reasoning in the process of solving problems via mathematical modeling with both linear and non-linear functions.  SPI 3103.3.12 Interpret graphs that depict real-world phenomena.  SPI 3103.3.13 Solve contextual problems using quadratic, rational, radical and exponential equations, finite geometric series or systems of equations.  SPI 3103.5.3 Analyze patterns in a scatter-plot and describe relationships in both linear and non-linear data.  English 3:  (reading op/ed pieces on the whaling industry and preparing for a debate using a graphic organizer)  CLE 3005.2.6 Deliver effective oral presentations.  CLE 3005.3.1 Write in a variety of modes for a variety of purposes and audiences.  CLE 3005.8.4 Analyze works of literature for what is suggested about the historical period in which they were written.  CLE 3005.7.2 Examine the agreements and conflicts between the visual (e.g., media images,  painting, film, graphic arts) and the verbal. | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | **T** | **A** | **E** |  | | | | | | | | | **T** | | **A** | | | **E** |
| **Professional (21st Century) Skills** to be taught, assessed and/or encouraged**:** | | | Collaboration | | | | | | | | X | X | X | Other: | | | | | | | | |  | |  | | |  |
| Communication (Oral Presentation) | | | | | | | | X |  | X |  | | | | | | | | |  | |  | | |  |
| Critical Thinking/Problem Solving | | | | | | | | X | X | X |  | | | | | | | | |  | |  | | |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Major Products & Performances** | Group: | | | * Teams of 3-4 students will create either a physical scaled model or a multimedia presentation to illustrate the progression of the 30 tallest U.S. buildings in the 20th century. | | | | | | | | | | | | | | | | **Presentation Audience**   **Presentation Audience:**      Class   School | | | | | | | | |
|  | Class X | | | | | | | |
|  | School X | | | | | | | |
|  | Community | | | | | | | |
| Individual: | | | * Lab report including: (a) table of measurements, (b) table of calculations of the height, (c) distribution, mean and standard deviation of measurements, | | | | | | | | | | | | | | | |  | Experts X | | | | | | | |
|  | Web | | | | | | | |
|  | Other: | | | | | | | |
| Project Overview page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Entry Event** to  launch inquiry,  engage students: | | Show photos of the highest bungee jumps in the world. Show photos of several of the tallest buildings in the world, and have students guess how tall they are. Discuss how students could go about measuring the height of something so tall. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Assessments** | | **Formative Assessments**  (During Project) | | | | X | | Quizzes/Tests | | | | | | | |  | | Practice Presentations | | | | | |  | | |
| X | | Journal/Learning Log | | | | | | | |  | | Notes | | | | | |  | | |
|  | | Preliminary Plans/Outlines/Prototypes | | | | | | | |  | | Checklists | | | | | |  | | |
|  | | Rough Drafts | | | | | | | |  | | Concept Maps | | | | | |  | | |
|  | | Online Tests/Exams | | | | | | | |  | | Other: | | | | | |  | | |
| **Summative Assessments**  (End of Project) | | | |  | | Written Product(s), with rubric:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | | X | | Other Product(s) or Performance(s), with  rubric:\_\_\_Scale model or Multimedia presentation\_\_\_\_\_\_\_\_\_\_ | | | | | |  | | |
|  | | Oral Presentation, with rubric | | | | | | | |  | | Peer Evaluation | | | | | |  | | |
| X | | Multiple Choice/Short Answer Test | | | | | | | |  | | Self-Evaluation | | | | | |  | | |
|  | | Essay Test | | | | | | | |  | | Other: | | | | | |  | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Resources Needed** | | **On-site people, facilities:** | | | | | | |  | | | | | | | | | | | | | | | | | | | |
| **Equipment:** | | | | | | | Laptop carts with internet access, kites, | | | | | | | | | | | | | | | | | | | |
| **Materials:** | | | | | | | Materials to make inclinometers: heavy card stock, popsicle sticks, paper clips, brads, scissors, stapler, hole punch, glue, copies of inclinometer template | | | | | | | | | | | | | | | | | | | |
| **Community resources:** | | | | | | | Bus to travel to downtown Nashville where tall buildings are located | | | | | | | | | | | | | | | | | | | |
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| **Reflection Methods** | | **(Individual, Group, and/or Whole Class)** | | | X | | Journal/Learning Log | | | | | | | |  | | Focus Group | | | | | |  | | |  | | |
| X | | Whole-Class Discussion | | | | | | | |  | | Fishbowl Discussion | | | | | |  | | |  | | |
|  | | Survey | | | | | | | |  | | Other: | | | | | |  | | |  | | |